## REMARKS

Claims 14, 16-20, 22-30 are pending in the application.

### Rejection under 35 U.S.C. 102

Claims 14, 18, 29, 30 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Kilp et al. (US 3,409,973)*.

Examiner argues that *Kilp et al.* discloses a cold rolling method for producing an annular composite workpiece. A first cylindrical hollow workpiece 18 is inserted into a second hollow cylindrical workpiece 20 of a different material. The two workpieces 18, 20 are axially roll-formed by pressing the first and second workpieces against each other between two diametrically opposed outer roll forming tools 12, 14 with a mandrel 24 inserted inside the workpiece 18. Examiner refers to col. 5, lines 58-75, and col. 6, lines 1-8, for details.

Examiner is respectfully requested to consider applicant's definition and explanation of "axial roll forming" as set forth in the specification when interpreting the claim language. Axial roll forming is a known process as explained on page 2, 5th full paragraph, of the instant specification (emphasis added):

> "When rolling, the material that is compressed by the **penetration of the profile transversely to the axial direction of the workpiece** is displaced laterally so far outwardly that across the original width of the workpiece … protruding lateral boundary edges are formed."

The arrangement of the tools and the workpiece relative to each other are shown in instant Figs. 9 and 10. This shows that the inner rolling arbor 7 and the outer forming tools 6 have axes of rotation that are parallel to each other. The tools and the workpiece are all oriented in the same direction. The outer tools act radially on the circumference of the workpiece with the inner arbor counteracting the force (black arrow in Fig. 9 ) applied by the outer tools 6. The material flow is in axial direction. See instant

specification, paragraph bridging pages 5 and 6:

> "Fig. 9 and Fig. 10 show in section and side view, respectively, the axial roll forming of a workpiece 1 between two diametrically opposed roll forming tools 6a and 6b and a rolling arbor 7. The tools 6a, 6b and 7 press radially against the workpiece 1. The material flows predominantly axially. Characteristic for the axial roll forming process is the enlargement of the width of the workpiece. The width increases at least by the amount that corresponds to the volume of the rolled-in groove."

Applicant has explained and set forth clearly what "axial roll forming" means. Examiner is reminded that applicant pursuant to MPEP 2173.01 Claim Terminology may use his own terms as long as the specification sets forth the meaning of the term:

> "A fundamental principle contained in **35 U.S.C. 112**, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as **>any special meaning assigned to a term is clearly set forth in the specification. "

Therefore, it is respectfully requested that examiner consider the claim language "axial roll forming" in the way the applicant has defined it in the specification: parallel arrangement of outer tools and inner arbor. Nonetheless, in order to define axial roll forming additionally by the given arrangement of the tools/arbor, claim 14 has been amended to set forth the arrangement of the axis of rotation of the rolling arbor / inner roll forming tool and the axes of rotation of the outer roll forming tools, i.e., the axes of rotation (see also Fig. 2 where the axes are shown in dashed lines and the rotation is indicated by arrows) are parallel and the pipe axis or cylinder axis of the workpiece extends of course also parallel. Figs. 9 and 10 of the instant application clearly illustrate the principle of axial roll forming and examiner is respectfully requested to consider

applicant's definition when considering the teachings of prior art.

In regard to the reference to *Kilp et al.*, it should first be noted that the tools 12, 14 of *Kilp et al.* are oriented such that the axes about which the tools will rock extend in Fig. 1 of *Kilp et al.* perpendicular to the paper plane and thus perpendicular to the axis of the mandrel 24. Note that the grooves 13 and 15 that shape the composite unit 16 (comprised of inner metal member 18, outer metal member 20, compactible material 22) extend in the longitudinal direction of the workpiece and not transversely as in axial roll forming. The grooves 13,1 5 have progressively varying depth and the unit 16 is reduced in cross-section by up to 70 % as it passes through the grooves 13, 15 (see col. 5, line 75, to col. 6, lines 1-11). The process of "rocking rolling" by means of the two tools 12, 14 is described in col. 3 , lines 2-15. The great reduction in cross-section also leads to a length increase (see Example 1, where the initial length of the steel cylinder is 78 inches and the final length is 143 inches).

From this it is clear that the axis of rotation of the tools 12, 14 is oriented at a right angle to the axis of the mandrel and thus also to the longitudinal axis of the cylindrical unit 16. The forming action takes place in longitudinal direction of the cylindrical composite unit 16 by the grooves 13, 15 and in order to achieve a uniform shaping in the circumferential direction of the unit 16, the unit 16 must be rotated (col. 3, lines 5-10, wherein "member" corresponds to the unit 16). According to instant claim14, the axis of the mandrel or inner tool and the axes of the outer tools are parallel to each other; this is not shown in *Kilp et al.*

An important feature of axial roll **forming** process is the forming action: the tools have forming means that extend transversely to the workpiece and produce a groove in the circumferential direction of the workpiece on the inside (see Fig. 6) or outside (e.g. Fig. 2); the material displaced by the forming tool moves axially outwardly (see Fig. 9). Such a forming of the workpiece in circumferential direction is impossible with the device of *Kilp et al.* because the grooves 13, 15 shape or form the workpiece in the axial direction and not in the circumferential direction and as the workpiece is rotated during the process the outer circumference is reduced to a uniform circular contour as

exemplified by the cross section shown in Fig. 2 of *Kilp et al.*

In summarizing the above, the apparatus and method of *Kilp et al.* has nothing to do with axial roll forming as claimed in instant claim 14.

Claim 14 is therefore not anticipated by *Kilp et al.*

In regard to claim 30, it is respectfully submitted that no cold pressure welding connection is produced between the first and second workpieces by *Kilp et al. Kilp et al.* teaches that a compactible material 22 is arranged between the first and second cylindrical workpieces and is compacted during the rocking forming process to a compact body 36 (see Fig. 2). Note in col. 3, lines 56-59, it is sets forth that there is an annular space between the tubular metallic members. Note that this space is in particular designed to receive e.g. thermoelectric material, such as lead telluride or germanium telluride, or nuclear fuel, such as uranium dioxide etc., especially in powder form (see col. 4, lines 37ff). There is no contact and certainly no weld connection between the inner and outer parts 32, 34 (Fig. 2) produced by the forming method, as there is an intermediate body between the two cylindrical members.

Claim 30 is not anticipated by *Kilp et al.*

Reconsideration and withdrawal of the rejection of the claims under 35 USC 102 are respectfully requested.

**Rejection under 35 U.S.C. 103**

Claims 16, 17, 19, 20, 22-28 stand rejected under 35 U.S.C. 103(a) as being unpatentable in view of *Kilp et al. (US 3,409,973).*

In regard to claim 16, Examiner argues that it would be obvious to provide the two cylindrical members so as to have so little radial play that they can be barely inserted. As already discussed above, *Kilp et al.* (col. 3, lines 56-59) sets forth that there is an annular space between the tubular metallic members and this space is provided to receive e.g. thermoelectric material or nuclear fuel especially in powder form (see col. 4, lines 37ff). This material is to be compacted between the outer and inner cylinders and is part of the composite to be produced. There is no suggestion to eliminate the compactible material from the structural unit and to provide the two cylinders without the

required annular receiving space (which is what would happen if the radial play barely allows insertion).

Claim 16 is therefore not obvious.

Claim 17 requires the use of rings. Examiner states that it would obvious to use rings in the process of *Kilp et al.* Applicant respectfully disagrees. The goal of *Kilp et al.* is to produce a unit 16 of great length as set forth in col. 3, lines 52-64: " ... we can readily secure an annular composite member up 75 feet in length ...". This is understandable as it is necessary to plug the two cylindrical members at their ends when compactible material is filled into the annular space in order to keep the compactible material from escaping. Using rings would mean extra expenditure for plugging the ends of each ring assembly in order to prevent escape of the powder material which is undesirable when it is easily possible to cut desired lengths from the finished product with a length of 75 feet.

Claim 17 is therefore not obvious.

In regard to claims 19 and 20 applicant respectfully submits that *Kilp et al.* does not show that one of the cylindrical workpieces is coated with an aluminum layer and that the surfaces touch one another or that there is an aluminum layer between the two cylindrical members to reduce weight; as discussed above, an annular space is provided and this space is filled with compactible material.

Claims 19 and 20 are not obvious in view of *Kilp et al.*

In regard to claims 22, 23, 24, it is respectfully submitted the elongate members such as thermoelectric elements or nuclear fuel rods are disclosed in *Kilp et al.* but nowhere is there any suggestion to produce a bearing ring or a gear ring. Especially when considering that the process of *Kilp et al.* cannot provide a shaping of the outer contour in the circumferential direction but only a size reduction and elongation of the cylinder, a bearing race as claimed in claim 23 cannot be formed.

Claims 22, 23, 24 are therefore not obvious.

Claims 14, 16-20, 22-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Winter (US 3,409,617)* and *Kilp et al. (US 3,409,973).*

Examiner argues that the reference to *Winter* discloses cold forming of a first and a second hollow cylindrical workpiece by rotary swaging. *Winter* according to the examiner does not disclose axial roll forming to press the cylindrical workpieces against each other but this is shown by *Kilp et al.* and, according to the examiner, it would be obvious to use the axial roll forming process of *Kilp et al.* in place of rotary swaging.

As set forth above, *Kilp et al.* shows no axial roll forming process. When using in place of the rotary swaging process of *Winter* the two outer tools and the inner mandrel as disclosed in *Kilp et al.*, the two outer arbors are positioned at a right angle to the inner arbor. As discussed in connection with the 102 rejection supra, the tools 12, 14 of *Kilp et al.* are oriented such that the axes about which the tools will rock extend in Fig. 1 of *Kilp et al.* perpendicular to the paper plane and thus perpendicular to the axis of the mandrel 24. The grooves 13 and 15 that shape the composite unit 16 or, in case of *Winter*, the assembly of core and clad have progressively varying depths and this causes a reduction in cross-section as the assembly passes through the grooves 13, 15 (see col. 5, line 75, to col. 6, lines 1-11). The process of "rocking rolling" by means of the two tools 12, 14 is described in col. 3, lines 2-15. The great reduction in cross-section also leads to a length increase (see Example 1, where the initial length of the steel cylinder is 78 inches and the final length is 143 inches). The axis of rotation of the tools 12, 14 is oriented at a right angle to the axis of the mandrel (note that *Winter* discusses – see col. 3, lines 6ff - that if a hollow material is used in place of the core, a mandrel is inserted inside the core prior to swaging, i.e., prior to the operation carried out in accordance with *Kilp et al.*) and thus also to the longitudinal axis of the assembly. The forming action according to *Kilp et al.* takes place in longitudinal direction of the assembly (core and clad) by the grooves 13, 15 and in order to achieve a uniform shaping in the circumferential direction of the assembly, the assembly must be rotated (col. 3, lines 5-10, of *Kilp et al.* wherein "member" corresponds to the unit 16 and therefore to the assembly of *Winter*). According to claim14, the axis of the mandrel or inner tool and the axes of the outer tools are parallel to each other; this is not shown in *Kilp et al.* It is not obvious to change the orientation of the tools because the tools cannot operate when their axis of rotation is parallel to the longitudinal extension of the

workpiece.

Claim 14 and its dependent claims are therefore not obvious in view of the combination of Winter and *Kilp et al.*

Reconsideration and withdrawal of the rejection of the claims under 35 USC 103 are respectfully requested.

## CONCLUSION

In view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Should the Examiner have any further objections or suggestions, the undersigned would appreciate a phone call or **e-mail** from the examiner to discuss appropriate amendments to place the application into condition for allowance.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on 2011-02-23,

/Gudrun E. Huckett/

Ms. Gudrun E. Huckett, Ph.D.
Patent Agent, Registration No. 35,747
Schubertstr. 15a
42289 Wuppertal
GERMANY
Telephone: +49-202-257-0371
US-Fax: (877) 470-9712
gudrun.draudt@t-online.de

GEH